

Claims

1. A method for determining the present location of a missing vehicle, /
the method comprising the steps of:

providing a vehicle with a vehicle location receiver/processor that receives position location signals from one or more location-sensing sensors and uses these signals to determine the present location of the receiver/processor;

providing the vehicle with a page responder to respond to a page request broadcast by a vehicle location service or paging service;

providing the vehicle with a cellular telephone that may be activated to place a telephone call to a selected telephone number;

providing the vehicle with a controller/modem that is electrically connected to, and controls the operation of, the receiver/processor, the page responder and the cellular telephone;

when the vehicle is determined to be missing, causing the vehicle location service to broadcast a page requesting the present location of the missing vehicle;

causing the page responder in the missing vehicle to receive the page request and, in response thereto, to cause the controller/modem to interrogate the receiver/processor concerning the present location of the missing vehicle;

causing the receiver/processor to obtain information on the present location of the missing vehicle and to provide this information for the controller/modem; and

allowing the controller/modem to cause the cellular telephone to contact a selected vehicle locator service and to communicate the missing vehicle present location information to the vehicle location service,

whereby information on the present location of the missing vehicle is made available to an owner or operator of the missing vehicle.

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2. The method of claim 1, further comprising the step of decoding said present vehicle location information received by said vehicle locator service.
 3. The method of claim 1, further comprising the step of causing said cellular telephone to communicate said present location information for said missing vehicle at least twice.
 4. The method of claim 1, further comprising the step of causing said cellular telephone to communicate said present location information for said missing vehicle once in response to receipt of said page request by said controller/modem.
 5. The method of claim 1, further comprising the step of displaying said present location of said missing vehicle on a map after said present location information is received by said vehicle location center.
 6. The method of claim 1, further comprising the step of causing said receiver processor to occupy an inactive mode and to reduce its electrical power consumption, except when responding to receipt of an interrogation from said controller/modem.
 7. The method of claim 6, further comprising the step of periodically activating said receiver /processor for a selected time interval and causing said receiver to redetermine its present location.
 8. The method of claim 1, further comprising the step of concealing the presence of at least one of said antenna and said cellular telephone ^{antenna} on said vehicle.
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9. The method of claim 1, further comprising the step of choosing said vehicle location receiver/processor to be a GPS signal receiver/processor that receives time-coded GPS signals from one or more satellites and determines said vehicle location from these signals.

10. The method of claim 1, further comprising the step of choosing said vehicle location receiver/processor to be a LORAN signal receiver/processor that receives time-coded LORAN signals from a plurality of LORAN signal transmitters and determines said vehicle location from these signals.

11. The method of claim 1, further comprising the step of choosing said vehicle location receiver/processor to comprise:

a plurality of gyroscopes and associated vehicle angular orientation sensors attached to said vehicle to determine and issue output signals indicating the present angular orientation of said vehicle;

a vehicle velocity sensor to determine and issue an output signal indicating the present velocity of said vehicle; and

a receiver/processor that receives the output signals from the vehicle angular orientation sensors and the vehicle velocity sensor and determines the present location of said vehicle from these signals.

12. The method of claim 1, further comprising the step of choosing said vehicle location receiver/processor to comprise:

a plurality of local magnetic field angular orientation sensors attached to said vehicle to determine and issue output signals indicating the present angular orientation of said vehicle;

a vehicle velocity sensor to determine and issue an output signal indicating the present velocity of said vehicle; and

a receiver/processor that receives the output signals from the vehicle angular orientation sensors and the vehicle velocity sensor and determines the present location of said vehicle from these signals.

13. A method for determining the present location of a missing vehicle, the method comprising the steps of:

providing a vehicle with a vehicle location receiver/processor that receives position location signals from one or more location-sensing sensors and uses these signals to determine the present location of the receiver/processor;

providing the vehicle with an event sensor to sense occurrence of a selected vehicle trigger event involving the vehicle;

providing the vehicle with a cellular telephone that may be activated to place a telephone call to a selected telephone number;

providing the vehicle with a controller/modem that is electrically connected to, and controls the operation of, the receiver/processor, the event sensor and the cellular telephone;

when the sensor determines that a vehicle trigger event has occurred, causing the controller/modem to interrogate the receiver/processor concerning the present location of the vehicle;

causing the receiver/processor to obtain information on the present location of the vehicle and to provide this information for the controller/modem; and

causing the controller/modem to cause the cellular telephone to contact a selected vehicle locator service and to communicate the missing vehicle present location information to the vehicle location service,

whereby information on the present location of the missing vehicle is made available to an owner or operator of the vehicle.

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14. The method of claim 13, further comprising the step of choosing, as said vehicle trigger event, the unauthorized movement of said vehicle, as sensed by said sensor.

15. The method of claim 13, further comprising the steps of:
choosing as said sensor a vehicle security alarm that senses occurrence of an unauthorized action affecting said vehicle; and
choosing, as said trigger event, activation of this security alarm.

16. The method of claim 13, further comprising the step of decoding said present vehicle location information received by said vehicle locator service.

17. The method of claim 13, further comprising the step of causing said cellular telephone to communicate said present location information for said missing vehicle at least twice.

18. The method of claim 13, further comprising the step of causing said cellular telephone to communicate said present location information for said missing vehicle once in response to occurrence of said vehicle trigger event

19. The method of claim 13, further comprising the step of displaying said present location of said missing vehicle on a map after said present location information is received by said vehicle location center.

20. The method of claim 13, further comprising the step of causing said receiver processor to occupy an inactive mode and to reduce its electrical power consumption, except when responding to receipt of an interrogation from said controller/modem.

21. The method of claim 20, further comprising the step of periodically activating said receiver /processor for a selected time interval and causing said receiver to redetermine its present location.
22. The method of claim 13, further comprising the step of concealing the presence of at least one of said antenna and said cellular telephone^{antenna}, on said vehicle. *dyb 16 Nov 92*
23. The method of claim 13, further comprising the step of choosing said vehicle location receiver/processor to be a GPS signal receiver/processor that receives time-coded GPS signals from one or more satellites and determines said vehicle location from these signals.
24. The method of claim 13, further comprising the step of choosing said vehicle location receiver/processor to be a LORAN signal receiver/processor that receives time-coded LORAN signals from a plurality of LORAN signal transmitters and determines said vehicle location from these signals.
25. The method of claim 13, further comprising the step of choosing said vehicle location receiver/processor to comprise:
a plurality of gyroscopes and associated vehicle angular orientation sensors attached to said vehicle to determine and issue output signals indicating the present angular orientation of said vehicle;
a vehicle velocity sensor to determine and issue an output signal indicating the present velocity of said vehicle; and
a receiver/processor that receives the output signals from the vehicle angular orientation sensors and the vehicle velocity sensor and determines the present location of said vehicle from these signals.

26. The method of claim 13, further comprising the step of choosing said vehicle location receiver/processor to comprise:

a plurality of local magnetic field angular orientation sensors attached to said vehicle to determine and issue output signals indicating the present angular orientation of said vehicle;

a vehicle velocity sensor to determine and issue an output signal indicating the present velocity of said vehicle; and

a receiver/processor that receives the output signals from the vehicle angular orientation sensors and the vehicle velocity sensor and determines the present location of said vehicle from these signals.

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27. Apparatus for determining the present location of a missing vehicle, the apparatus comprising:

a GPS signal antenna and a receiver/processor connected to the antenna, to receive and process GPS signals to determine the present location of the antenna;

paging response means for receiving a specified paging signal and, in response thereto, issuing a paging response means output signal;

controller means, connected to the GPS receiver/processor and to the paging response means, for receiving the paging response means output signal and, in response thereto, issuing a first output signal that is received by the GPS receiver/processor that commands the receiver/processor to determine and issue as an output signal the present location of the antenna, and for receiving the receiver/processor output signal representing present location of the antenna and issuing this present location information as a second output signal;

a cellular transmitter, connected to the controller means, for receiving the controller means second output signal and, in response thereto, transmitting the controller means second output signal to a selected telephone

number; and

a power supply to deliver electrical power to at least one of the antenna, the receiver/processor, the paging response means, the controller means and the cellular transmitter,

where the antenna, the receiver/processor, the paging responder, the controller means, and the cellular transmitter are all carried on the vehicle whose present location is to be determined.

28. Apparatus for determining the present location of a missing vehicle, the apparatus comprising:

a GPS signal antenna and a receiver/processor connected to the antenna, to receive and process GPS signals to determine the present location of the antenna;

an event sensor that determines when a selected trigger event involving the vehicle has occurred and issuing a sensor output signal when that event occurs;

controller means, connected to the GPS receiver/processor and to the event sensor, for receiving the event sensor output signal and, in response thereto, issuing a first output signal that is received by the GPS receiver/processor that commands the receiver/processor to determine and issue as an output signal the present location of the antenna, and for receiving the receiver/processor output signal representing present location of the antenna and issuing this present location information as a second output signal;

a cellular transmitter, connected to the controller means, for receiving the controller means second output signal and, in response thereto, transmitting the controller means second output signal to a selected telephone number; and

a power supply to deliver electrical power to at least one of the antenna, the receiver/processor, the event sensor, the controller means and

the cellular transmitter,

where the antenna, the receiver/processor, the event sensor, the controller means, and the cellular transmitter are all carried on the vehicle whose present location is to be determined.

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